

NOAA Data Report ERL GLERL-23



LAKE MICHIGAN SUSPENDED SEDIMENT CHARACTERISTICS
AT GRAND HAVEN, MICHIGAN, 1979

Nathan Hawley

Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan
February 1983

Data available on microfiche
Contact: pubs@glerl.noaa.gov

noaa NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

Environmental Research
Laboratories

NOAA Data Report ERL GLERL-23

LAKE MICHIGAN SUSPENDED SEDIMENT CHARACTERISTICS
AT GRAND HAVEN, MICHIGAN, 1979

Nathan Hawley

Great Lakes Environmental Research Laboratory
Ann Arbor, Michigan
February 1983



UNITED STATES
DEPARTMENT OF COMMERCE

Malcolm Baldrige,
Secretary

NATIONAL OCEANIC AND
ATMOSPHERIC ADMINISTRATION

John V. Byrne,
Administrator

Environmental Research
Laboratories

George H. Ludwig
Director

NOTICE

Mention of a commercial company or product does not constitute an endorsement by NOAA Environmental Research Laboratories. Use for publicity or advertising purposes of information from this publication concerning proprietary products or the tests of such products is not authorized.

CONTENTS

	Page
Abstract	1
1. INTRODUCTION	1
2. PROCEDURE	1
3. DATA PRESENTATION	2
4. ACKNOWLEDGMENTS	2
Appendix A--PARTICLE TYPE DATA COLLECTED DURING SPRING AND SUMMER 1981	{ Microfiche Inside
Appendix B--PARTICLE TYPE DATA COLLECTED DURING FALL 1981-82	{ Back Cover

TABLE

Page

1. Equivalences between spring and fall particle type measurements. 3

LAKE MICHIGAN SUSPENDED SEDIMENT CHARACTERISTICS

AT GRAND HAVEN, MICHIGAN, 1979¹

Nathan Hawley

Suspended sediments collected on 4 different days in 1979 have been measured with a Quantimet image analyzer and identified by particle type. The data may be used to deduce changes in particle composition as a function of particle size, season of the year, and water depth.

1. INTRODUCTION

This data report presents the results of a study of the types of particulate material found off Grand Haven, Mich. The samples were collected on 4 different days during 1979--May 9, May 30, August 11, and October 16--at a station approximately 10 km due west of Grand Haven, in about 80 m of water (latitude 43°03'00" N, longitude 86°27'00" W). The study was designed to determine the variations in particle type as a function of particle size, season of the year, and position in the water column. The data are not interpreted in this report.

2. PROCEDURE

Five-liter water samples were collected from seven depths on each of the 4 days. Two liters were filtered through glass fiber filters to determine the total suspended material. A HIAC particle counter was used to determine the number of particles in five size ranges: 2-4, 4-8, 8-16, 16-32, and 32-60 μ m (diameter). For most depths, three 7-ml samples were analyzed. Finally, 100-200 ml from each depth were gravity filtered through glass fiber filters.

These filters were oven dried and mounted on glass microscope slides with Permount. A Quantimet image analyzer was then used to measure the size. Particle type identifications were done visually at the same time, so both the type and size of each particle is known.

The measurements were made in two groups: one during spring 1981, when 10 types of particles were identified, and the other during fall of the same year, when 12 types were identified. In all but one case the conversion between one set of types and the other was easily made. During the fall measurements, whole dead diatoms were grouped separately and living diatoms were grouped as living material, while in the earlier measurements, both living and dead diatoms were grouped together. Further examination of the slides measured during spring shows that about 75 percent of the whole diatoms for

¹ GLERL Contribution No. 324.

May 9, May 30, and August 11 were living, while 50 percent of those on October 16 were. Table 1 gives the equivalences between the two sets of particle types.

Fecal pellets were distinguished by their obvious ellipsoidal or cylindrical shape, their density, and the presence of organic binding agents. Fecal material was less densely packed than the pellets, and had an irregular shape. Organic aggregates resembled fecal material, but had mostly single mineral grains within them, whereas the fecal material had numerous diatom parts. Inorganic aggregates were rare and consisted of groups of minerals with little or no organic material. Light minerals included the clays, quartz, and feldspars, as well as any other transparent minerals other than calcite, which were counted separately. Heavy minerals included all translucent grains. Opaque minerals and diatom fragments are self-explanatory. Living material was identified by the presence of chloroplasts within the cell walls or by the structure of the particle. It included diatoms, algae, and pollen spores. "Others" was a catch-all category for unidentifiable particles.

3. DATA PRESENTATION

The data collected during spring and summer 1981 are listed in appendix A, and those collected during fall 1981-82 in appendix B. Both appendices have the same general format. The first line for each station gives the date collected, the station number, the number of particles measured by the image analyzer, the depth in meters, and the total suspended material (milligrams per liter). The second line gives the total water depth (meters) and the particle concentrations (if measured) for (in order) the 2-4, 4-8, 8-16, 16-32, and 32-60 μm ranges. Concentrations are in particles per milliliter. The remainder of the lines give the size and type measurements. In appendix A, the order is: area, perimeter, four diameters, particle type (all units are microns). In appendix B the order is: area, perimeter, four measured diameters, average diameter, and particle type.

4. ACKNOWLEDGMENTS

I would like to thank R. L. Chambers for collecting the samples, T. Williams for instruction on the image analyzer, and N. Wolter for help in making the measurements. M. Evans and R. Glover provided useful hints for identifying various particle types.

This work was jointly supported by the Long Range Effects Research Program of the Office of Marine Pollution Assessment, NOAA, and the Great Lakes Environmental Research Laboratory, NOAA.

TABLE 1.--Equivalences between spring and
fall particle type measurements

Spring	Fall
Fecal pellets (7)	Fecal pellets (1)
Organic aggregates (8)	{ Fecal material (2) Organic aggregates (3)
Inorganic aggregates (9)	Inorganic aggregates (4)
Light minerals (5)	Light minerals (5)
Calcite (4)	Calcite (6)
Heavy minerals (6)	Heavy minerals (7)
Opaques and others (0)	Opaques (8)
Diatom fragments (2)	Diatom fragments (9)
Whole diatoms (1)	Whole dead diatoms (10)
Other living (3)	{ Living material (11) Others (12)